

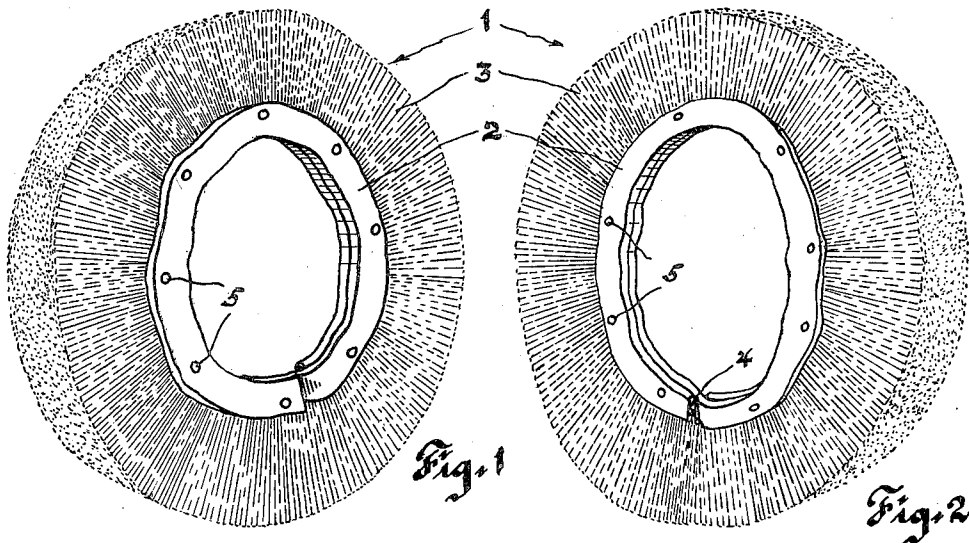
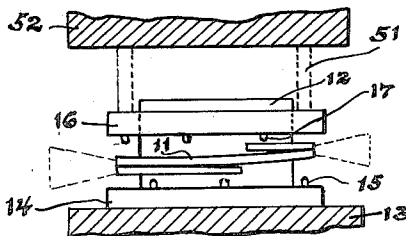
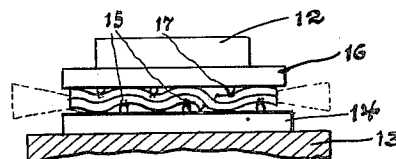
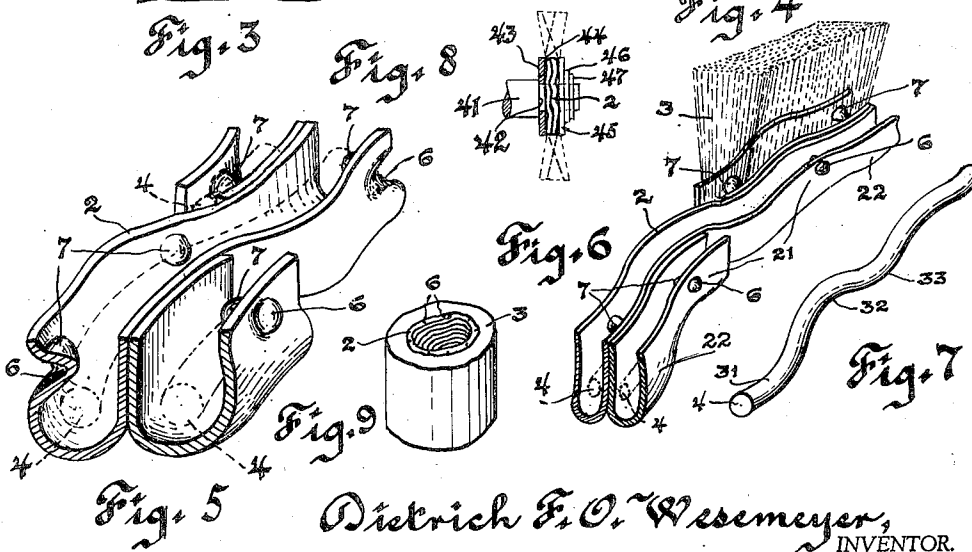
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D. F. O. WESEMEYER

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DOUBLE-LOCKED BRUSHING UNIT AND METHOD OF MAKING THE SAME

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Dietrich F. O. Wesemeyer,
INVENTOR.

BY Saywell & Wesseler,
ATTORNEYS.

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DOUBLE-LOCKED BRUSHING UNIT AND
METHOD OF MAKING THE SAMEDietrich F. O. Wesemeyer, Euclid, Ohio, assignor
to Spiral Brushes, Incorporated, Cleveland,
Ohio, a corporation of Ohio

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12 Claims. (Cl. 300—21)

This invention as indicated relates to a double-lock brushing unit and method of making the same. More particularly it comprises a spiral brush wherein a channel strip is firmly engaged against a plurality of brushing fibres which are folded about a holding wire locked firmly in the lower portion of the channel strip. The brushing unit is preferably formed into a coil of predetermined size at the time it is being fabricated and at such time the free edges of the channel strip are pressed inwardly so as to engage about the holding wire and its interengaged strand material which projects from the open portion of the channel. The invention includes the impressing of the terminal portions of a coiled brushing unit of the type just mentioned so as to produce in the outer surface of the channel strip around the final turn of such strip at each end a series of inwardly extending projections. These projections are of conical shape and are positioned near the upper edge of the outer face of the channel strip around the end turn and overlie the central portion of the channel strip immediately above the position of the holding wire. These projections when formed in the final turns of the channel strip at each side crimp the channel strip metal more firmly on the material engaged therein, and at the same time produce a convex area within the channel strip adjacent each projection and a concave area on the outer surface of the channel strip at such point. The channel strip will thus be given a corrugated or sinuous structural outline as seen from below the channel strip, and the holding wire itself will be given a sinuous outline within the final turn of the channel strip at each end. The invention, thus, may be said to provide a double-locked brushing unit inasmuch as the projections extending above the holding wire provide one lock of the combination, and the series of bends or corrugations in the holding wire and in the channel strip around its final turn provides a corrugated interlock between the holding wire and the channel strip which effectively restrains any slippage or longitudinal movement of the holding wire, and this forms a second locking feature included within the invention as above set forth. The method included in the invention covers the simultaneous forming of the locking projections and the locking corrugations in the structure set forth.

The principal object of the present invention is to provide an improved brushing unit having a double-locked construction.

Another object of the invention is to provide a

method of making a brushing unit for use on machine spindles as a replaceable unit wherein such unit has a terminal coil on each end formed with inwardly extending locking projections and simultaneously formed with interlocking corrugations impressed in the channel strip and holding wire.

Another object of the invention is to reduce the cost and simplify the construction of replaceable units for industrial brushing apparatus, and at the same time make such units doubly secure against injury through failure of the terminal portions thereof.

Another object of the invention is to produce brushing units having a double-locked feature adjacent their terminal portions of greater strength and dependability than where bending and welding operations require the application of intense heat to such terminal areas and parts adjacent thereto.

Another object of the invention is to provide a double-locking terminal area over the final turn of a helically coiled brushing unit which is distributed throughout the final turn providing a series of spaced locking structures whereby the operative strains are distributed over a multiplicity of points and whereby the accidental destruction of one point will be negligible and not affect the dependability of the anchorage of the brushing coil at each of its end portions.

Other and further objects of the invention will appear in the course of the following description.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the method and product hereinafter fully described and pointed out in the claims.

The annexed drawing and the following description set forth in detail certain steps for carrying out the invention, and one product resulting therefrom, such disclosed method and product illustrating, however, but several of various applications of the principles of the invention.

In said annexed drawing:

Fig. 1 is a perspective view showing a brushing unit embodying the principles of the invention as seen from the right-hand side of the structure;

Fig. 2 is a view similar to Figure 1 showing said structure as seen from the left-hand side;

Fig. 3 is an edge view of a brushing coil in position beneath the elements of a power press preliminary to the action of said press against the coils thereof;

Fig. 4 is a view similar to Figure 3 illustrating

the coil of the brushing unit after the press has acted in compressing relation thereon;

Fig. 5 is an enlarged fragmentary perspective view illustrating the formation of locking projections and corrugated areas in the brushing strip and holding wire;

Fig. 6 is a diagrammatic view in perspective showing the relative positions of the locking projections formed in the outer walls of the channel strip on each side adjacent the area around the extreme ends of the coil;

Fig. 7 is a fragmentary perspective view showing the corrugations formed in the terminal portion of the holding wire;

Fig. 8 is a reduced diagrammatic view showing a brushing unit having a double-locked terminal construction as mounted in operative position on the spindle of a brushing apparatus; and

Fig. 9 is a diagrammatic perspective view showing the end portion of a brushing unit of substantial size and with a large number of coil turns intermediate the terminal portions thereof.

The present invention has in view simplifying the construction of brushing units and particularly those adapted for use on the spindles of industrial brushing apparatus, and at the same time insuring the anchorage of the terminal portions of each brushing unit so that the strains imposed thereon are distributed over a number of anchorage points whereby the failure of a single point will not affect the security and dependability of the structure. In addition to forming anchorage elements at spaced intervals about the terminal portions of the brushing unit on each side the production of such anchorage elements in the form of projections extending across the upper portion of the channel strip around each outside turn deforms the channel strip adjacent the point of each projection and deforms the wire therein at the same time.

It will be noted by reference to Figures 1 and 2 that the brushing unit 1 is formed of a channel strip 2 having a plurality of radially positioned brushing strands 3 engaged about a holding wire 4 held deep within the channel strip through the compressing of the free edges of the channel strip in clamping relation to each other. There are also shown at spaced points around the right-hand face of the brush a series of inwardly struck metal areas 5 producing depressions 6 on the outer surface of the channel strip and the projections 7 within the channel strip. A similar number of spaced metal areas struck inwardly from the final turn of the channel strip on the left-hand side of the brushing unit are formed and thus the final turn of the channel strip on each side is provided with double-locking elements formed simultaneously over each of said terminal areas.

The method of forming the inward projections in the final turns of the channel strip of the coil is illustrated in Figures 3 and 4 wherein the brushing unit preliminary to pressing 11, is placed over a central cylindrical positioning member 12 on the lower plate 13 of the press after an annular member 14 having a series of upstanding studs 15 has been engaged around said cylindrical member. The brushing unit 11 is moved around the central member to an extent sufficient to position one of said studs in slightly spaced relation from the extreme end of the channel strip on the under side of the brush. An annular member 16 having a stud similar to the studs 15 heretofore mentioned at equally spaced points about its under surface is placed against the ter-

minal coil or turn of the channel strip at its upper portion, care being taken that this series of studs 17 is arranged so as to position one stud at a point slightly removed from the extreme end of the channel strip so as to be an effective terminal anchorage at such point. It will be noted that as shown in Figure 4 the coils within the press after the compression force has been applied will present a series of corrugations impressed in the channel strip and also in the holding wire within the same. These corrugations provide a depression 21 adjacent the inwardly struck metal areas leaving the intermediate portions 22 as outwardly bowed areas as shown in Figures 6 and 7 of the drawing. The holding wire 31 is given a curvature 32 to correspond with the depressed areas 21 of the channel strip and the intermediate portions 33 are bowed outwardly, thus giving the wire a series of corrugations, as seen plan view.

The structure illustrated in Figure 5 is diagrammatic in character and shows approximately the appearance of the channel strip adjacent the extreme end portion of the coil after the compressed strip has been opened up and the holding wire and brushing strands removed therefrom, leaving for easy inspection the inwardly projected metal areas above the position of the holding wire and showing the corrugated areas of the channel strip.

In Figure 8 of the drawing a narrow brushing unit having a corrugated channel strip of a few turns is shown as mounted on a shaft or spindle of an industrial unit, the shaft 41 being provided with a shoulder 42 against which a clamping plate 43 having a central recess and a slightly overhanging marginal edge 44 for engaging over the top edge of the final turn of the channel strip on each side, the companion plate 45 being similar to the plate 43 but turned in the opposite direction. The end of the shaft is screw-threaded and is provided with a nut 46 and a lock-nut 47.

Where a brushing unit with a large number of turns is required the method of making the same is similar to that above described, the central cylindrical member being of greater height and the members of the press being opened to a greater degree to receive the unit. As is indicated in Figure 3 the pressure against the annular member 16 above the brush is applied by means of a tubular sleeve or collar 51 bearing against the annular member and acted upon by the upper plate 52 of the press. The finished unit is shown in Figure 9.

The method involved in producing the brushing unit has been indicated in connection with the description of Figures 3 and 4. It is not limited, however, to the use of any particular type of apparatus. The steps of the method comprise the displacing of metal areas at spaced points around the final turn of the channel strip inwardly so as to form a locking projection above the holding wire at such spaced points, and also to form transverse corrugations in both the channel strip and the holding wire within the same. Thus, the holding wire and its associated material cannot move radially by reason of the projections being positioned above the same, and for the further reason that narrow corrugations will lock against radial movement into wider corrugation area. The transverse corrugations in the channel strip and holding wire will also resist lengthwise movement relatively to each other.

The inward projections also have a locking movement against lengthwise displacement of the

channel by reason of the engagement with the adjacent brushing strands immediately above the holding wire greatly increasing the frictional engagement of these parts. The method also provides for the steps of simultaneously displacing metal areas at spaced points around the outer side of the coil in the last turn of the channel strip, and at the same time deforming the adjacent area and its enclosed holding wire into transverse corrugations and duplicating these functions and effects on the opposite final turn of the channel strip through the exercise of a single pressure movement.

The method above defined effects a high speed of production and at the same time produces a double-locked structure at each end of the brushing unit which is of greater holding capacity and dependability than structures involving a series of securing operations. It is also pointed out that no welding operations are required and no bending of the holding wire into hooked shape at its ends is necessary. Each of the anchorages distributed at spaced intervals around the final turn of the brush is itself effective as a final anchorage and by reason of the eight individual anchorages, as shown, the factor of safety in this type of construction is very large. By placing one of these anchorages in closely spaced relation to the extreme end of the channel strip on each side the clamping effect on the material adjacent thereto coupled with the jog or offsetting of the adjacent turn of the channel strip effectively locks the material in the extreme ends of the channel strip against displacement.

While the channel strip has been illustrated in the preferred form wherein the end coils are squared with the axis of the brush and the intermediate turns adjacent thereto are provided with jogs or offsets, it is to be understood that the method may be practiced with annular members having a shoulder and a spiral compression area whereby the locking effects would be obtained even though no offsets were produced in the brushing units. Such units could be used with clamping plates provided with shoulders on their inner faces to engage the extreme ends of the channel strip and exert a driving and interlocking pressure on the brushing unit. Such end plates should be provided with a projecting marginal edge or equivalent structure to securely anchor the unit on the operating shaft or spindle of the brushing apparatus.

Other modes of applying the principle of my invention may be employed instead of those explained, change being made as regards the method and structure herein disclosed, provided the steps and structure included in the following claims or the equivalent thereof be employed.

I therefore particularly point out and distinctly claim as my invention:

1. The method of making a double-locked brushing unit which comprises forming a hollow cylindrical brush coil of a channel strip with its free upper edges pressed in clamping relation to radial brushing strands engaged centrally over a holding wire secured within the lower portion of said channel strip, which includes the steps of first forming the channel strip into a coil with a crimped upper edge, then forcing inwardly at spaced points around the outer turn of the channel strip a plurality of projections from the at least one wall of said channel strip in locking relation immediately above the holding wire within said channel strip, and simultaneously displacing the holding wire and channel strip walls trans-

versely adjacent the end turn of said brushing unit.

2. The method of making a double-locked brushing unit which comprises forming a hollow cylindrical brush coil of a channel strip with its free upper edges pressed in clamping relation to radial brushing strands engaged centrally over a holding wire secured within the lower portion of said channel strip, which includes the step of forcing inwardly at spaced points around the outer turn of the channel strip a plurality of projections from the outer wall of said channel strip in locking relation immediately above the holding wire within said channel strip and simultaneously forming transverse interlocking corrugations in said channel strip and the area of holding wire within the same.

3. The method of making a double-locked brushing unit which comprises forming a hollow cylindrical brush coil of a channel strip with its free upper edges pressed in clamping relation to radial brushing strands engaged centrally over a holding wire secured within the lower portion of said channel strip, which includes the step of displacing inwardly said channel strip and wire at spaced points around the outer turn of the channel strip at each end simultaneously, forming corrugations in said channel strip in locking relation with a holding wire, and squaring the end faces of said brushing unit.

4. The method of making a double-locked brushing unit which comprises forming a hollow cylindrical brush coil of a channel strip with its free upper edges pressed in clamping relation to radial brushing strands engaged centrally over a holding wire secured within the lower portion of said channel strip, which includes the step of forcing inwardly at spaced points around the outer turn of the channel strip at each end simultaneously, a plurality of projections from the outer wall of said channel strip in locking relation immediately above the holding wire within said channel strip, and simultaneously forming transverse interlocking corrugations in said channel strip and the area of holding wire within the same.

5. The method of interlockingly engaging and anchoring the terminal portion of a brushing unit wherein the projecting brushing strands are engaged around a holding wire within a U-shaped channel strip which includes the steps of striking inwardly from one wall of the channel strip at least one transverse projection immediately above the holding wire and simultaneously deforming into transverse interlocking engagement the body of the channel strip and the area of holding wire within the same.

6. An article of the character described having a brushing unit formed of a channel strip clamped about brushing strands engaged about a holding wire within the lower portion of said channel strip, transverse corrugations in at least the end portions of said channel strip and holding wire and pressed metal extensions formed in said channel strip projecting inwardly from a side wall thereof immediately above said holding wire for locking the said brushing strands and holding wire within said channel strip.

7. An article of the character described having a brushing unit formed of a hollow cylindrical wound channel strip clamped about brushing strands engaged about a holding wire within the lower portion of said channel strip, transverse corrugations formed in at least the end portions of said channel strip and holding wire and pressed

metal extensions within said channel strip for locking the said brushing strands and holding wire within said channel strip.

8. An article of the character described having a brushing unit formed of a channel strip clamped about brushing strands engaged about a holding wire within the lower portion of said channel strip, transverse corrugations formed in at least the end portions of said channel strip and holding wire the terminal area of said channel strip for locking the said brushing strands and holding wire within said channel strip, end faces at each terminal portion of said brushing unit squared to the axis thereof, and transversely displaced areas in the channel strip adjacent said squared end faces.

9. An article of the character described having a brushing unit formed of a hollow cylindrically wound channel strip clamped about brushing strands engaged about a holding wire within the lower portion of said channel strip, and pressed metal extensions at, at least, one point of each final outer turn of said channel strip projecting inwardly from a side wall thereof immediately above said holding wire for locking the same within said channel strip, and transverse interlocking corrugations in said channel strip and holding wire adjacent said pressed metal extensions.

10. An article of the character described having a brushing unit formed of a hollow cylindrically wound channel strip clamped about brushing strands engaged about a holding wire within

the lower portion of said channel strip, and pressed metal extensions at, at least, one point of each final outer turn of said channel strip projecting inwardly from a side wall thereof immediately above said holding wire for locking the same within said channel strip, and a transverse corrugation in the channel strip and holding wire adjacent each inward metal extension whereby double-locking action of said interengaged parts is effected.

11. An article of the character described having a brushing unit formed of a hollow cylindrically wound channel strip clamped about brushing strands engaged about a holding wire within the lower portion of said channel strip, and pressed metal extensions positioned at a plurality of spaced points on each final outer turn of said channel strip, said extensions projecting inwardly from a side wall thereof immediately above said holding wire, and a series of corrugations formed in said channel strip and holding wire adjacent the several positions of said extensions whereby double-locking action is provided for said interengaged parts.

12. An article of the character described having a brushing unit formed of a channel strip clamped about brushing strands engaged about a holding wire within the lower portion of said channel strip, said channel strip and holding wire having adjacent displaced areas interlockingly engaging said elements and the brushing strands intermediate the same.

DIETRICH F. O. WESEMEYER.